

THE ASTROPHYSICAL JOURNAL
CONTENTS OF VOLUME 491, PART 1

1997 DECEMBER 10, Number 1

	<i>Page</i>
A CRITICAL TEST OF TOPOLOGICAL DEFECT MODELS: SPATIAL CLUSTERING OF CLUSTERS OF GALAXIES <i>Renyue Cen</i>	1
CONSTRAINTS ON THE INTERGALACTIC TRANSPORT OF COSMIC RAYS <i>Fred C. Adams, Katherine Freese, Gregory Laughlin, Nathan Schwadron, & Gregory Tarlé</i>	6
REBUILDING THE CEPHEID DISTANCE SCALE. I. A GLOBAL ANALYSIS OF CEPHEID MEAN MAGNITUDES <i>C. S. Kochanek</i>	13
NEUTRAL HYDROGEN GUNN-PETERSON ABSORPTION FROM AN OVERDENSITY IN THE DIFFUSE INTERGALACTIC MEDIUM AT REDSHIFT 0.8? <i>Valery K. Khersonsky, David A. Turnshek, & Sheflynn M. Strub</i>	29
AN X-RAY SIZE-TEMPERATURE RELATION FOR GALAXY CLUSTERS: OBSERVATION AND SIMULATION <i>Joseph J. Mohr & August E. Evrard</i>	38
ADDITIONAL OBSERVATIONS AND ANALYSIS OF THE Ly α ABSORPTION LINES TOWARD THE QSO PAIR Q0107-025A,B <i>Nadine Dinshaw, Ray J. Weymann, Chris D. Impey, Craig B. Foltz, Simon L. Morris, & Tom Ake</i>	45
EMISSION LINES FROM COMPANION GALAXIES OF QSOs <i>Oleg Y. Gnedin</i>	69
ACTIVE GALACTIC NUCLEI AND GALAXY FORMATION <i>Arati Chokshi</i>	78
AN ANALYSIS OF THE GAMMA-RAY BURST NO-HOST PROBLEM <i>Samuel B. Larson</i>	86
EXTRAGALACTIC CONTENT OF GAMMA-RAY BURST LOCALIZATIONS <i>Samuel B. Larson & Ian S. McLean</i>	93
ON THE DYNAMICAL AND PHYSICAL STATE OF THE "DIFFUSE IONIZED MEDIUM" IN NEARBY SPIRAL GALAXIES <i>Jing Wang, Timothy M. Heckman, & Matthew D. Lehnert</i>	114
NUCLEAR FORMALDEHYDE ABSORPTION IN NGC 253 <i>Willem A. Baan, Ann E. Bragg, Christian Henkel, & Thomas L. Wilson</i>	134
THE H I HALO OF NGC 891 <i>R. A. Swaters, R. Sancisi, & J. M. van der Hulst</i>	140
HUBBLE SPACE TELESCOPE IMAGING OF THE HOST GALAXIES OF THREE X-RAY-SELECTED BL LACERTAE OBJECTS <i>Buell T. Jannuzi, Brian Yanny, & Chris Impey</i>	146
TWO CONFIRMED CATAclysmic VARIABLES IN THE OLD STELLAR CLUSTER NGC 6791 <i>J. Kaluzny, K. Z. Stanek, P. M. Garnavich, & P. Challis</i>	153
THE PULSAR CONTRIBUTION TO THE DIFFUSE GALACTIC GAMMA-RAY EMISSION <i>Martin Pohl, Gottfried Kanbach, Stan D. Hunter, & Brian B. Jones</i>	159
SMALL-SCALE VARIATIONS IN THE $\frac{1}{4}$ keV X-RAY BACKGROUND ALONG THE GALACTIC PLANE <i>Sangwook Park, John P. Finley, & S. L. Snowden</i>	165
A LARGE-SCALE SPECTROSCOPIC SURVEY OF EARLY-TYPE STARS AT HIGH GALACTIC LATITUDES <i>Rex A. Saffer, F. P. Keenan, N. C. Hambly, P. L. Dufton, & James Liebert</i>	172
COMPARISONS OF A GALACTIC KINEMATIC MODEL WITH TWO PROPER-MOTION SURVEYS IN THE VICINITY OF THE NORTH GALACTIC POLE <i>B. Chen</i>	181

OBSERVATIONS OF [C I] AND CO ABSORPTION IN COLD, LOW-DENSITY CLOUD MATERIAL TOWARD THE GALACTIC CENTER BROAD-LINE EMISSION <i>J. Stutzki, R. A. Chamberlin, S. P. Balm, A. A. Stark, A. P. Lane, R. Schieder, & G. Winnewisser</i>	Page 191
INTERSTELLAR FILAMENTS AND THE STATISTICS OF GALACTIC H I <i>A. Lazarian & D. Pogosyan</i>	200
SOME INTERSTELLAR REACTIONS INVOLVING ELECTRONS AND NEUTRAL SPECIES: ATTACHMENT AND ISOMERIZATION <i>Simon Petrie & Eric Herbst</i>	210
HYDRODYNAMICS OF CLOUD COLLISIONS IN TWO DIMENSIONS: THE FATE OF CLOUDS IN A MULTIPHASE MEDIUM <i>Francesco Miniati, T. W. Jones, Andrea Ferrara, & Dongsu Ryu</i>	216
SPECTROPHOTOMETRIC DATA OF THE CENTRAL STAR OF THE LARGE MAGELLANIC CLOUD PLANETARY NEBULA N66: QUANTITATIVE ANALYSIS OF ITS WN-TYPE SPECTRUM <i>M. Peña, W.-R. Hamann, L. Koesterke, J. Maza, R. H. Méndez, M. Peimbert, M. T. Ruiz, & S. Torres-Peimbert</i>	233
THE HIGH-EXCITATION PLANETARY NEBULA NGC 7662 <i>Siek Hyung & Lawrence H. Aller</i>	242
MAGNETIC FIELD STRUCTURE IN PROTOSTELLAR ENVELOPES <i>R. L. Akeson & J. E. Carlstrom</i>	254
INERTIA OF HEAT IN ADVECTIVE ACCRETION DISKS AROUND KERR BLACK HOLES <i>A. M. Beloborodov, M. A. Abramowicz, & I. D. Novikov</i>	267
HYDROGEN PHASES ON THE SURFACE OF A STRONGLY MAGNETIZED NEUTRON STAR <i>Dong Lai & Edwin E. Salpeter</i>	270
THERMAL RESPONSE OF A NEUTRON STAR TO A GLITCH <i>Satoru Hirano, Noriaki Shibasaki, Hideyuki Umeda, & Ken'ichi Nomoto</i>	286
MAGNETOSPHERIC SCATTERING OF PULSAR SURFACE RADIATION <i>Mohan Rajagopal & Roger W. Romani</i>	296
ON SPACE VELOCITIES OF BINARY STARS IN WHICH ONE COMPONENT HAS EXPERIENCED A SUPERNOVA EXPLOSION <i>Icko Iben, Jr., & Alexander V. Tutukov</i>	303
THE PROPERTIES OF X-RAY AND OPTICAL LIGHT CURVES OF X-RAY NOVAE <i>Wan Chen, C. R. Shrader, & Mario Livio</i>	312
BERYLLIUM IN LITHIUM-DEFICIENT F AND G STARS <i>Alex Stephens, Ann Merchant Boesgaard, Jeremy R. King, & Constantine P. Deliyannis</i>	339
FIRST-OVERTONE CO VARIABILITY IN YOUNG STELLAR OBJECTS <i>Ana M. Biscaya, G. H. Rieke, Gopal Narayanan, K. L. Luhman, & E. T. Young</i>	359
AN EQUATION OF STATE FROM COOL DENSE FLUIDS TO HOT GASES FOR MIXED ELEMENTS <i>G. Q. Luo</i>	366
ON THE LIGHT CURVES OF STRIPPED-ENVELOPE SUPERNOVAE <i>A. Clocchiatti & J. C. Wheeler</i>	375
LONG-TERM FLUX MONITORING OF LSI +61°303 AT 2.25 AND 8.3 GHz <i>P. S. Ray, R. S. Foster, E. B. Waltman, M. Tavani, & F. D. Ghigo</i>	381
SIMPLE PHOTOELECTRIC ABSORPTION DURING DIPPING IN THE ASCA OBSERVATION OF XB 1916-053 <i>M. J. Church, T. Dotani, M. Balucińska-Church, K. Mitsuda, T. Takahashi, H. Inoue, & K. Yoshida</i>	388
THEORETICAL STUDY OF THE SPATIALLY RESOLVED SOFT X-RAY VERSUS HARD X-RAY RELATIONSHIP IN SOLAR FLARES <i>Peng Li, James M. McTiernan, & A. Gordon Emslie</i>	395
HARD X-RAY EMISSION FROM ACTIVE REGION TRANSIENT BRIGHTENINGS <i>Nariaki Nitta</i>	402
SEARCH FOR PERIODICITIES IN THE HOMESTAKE SOLAR NEUTRINO DATA <i>P. A. Sturrock, G. Walther, & M. S. Wheatland</i>	409
SPATIAL AND TEMPORAL INVARIANCE IN THE SPECTRA OF ENERGETIC PARTICLES IN GRADUAL SOLAR EVENTS <i>D. V. Reames, S. W. Kahler, & C. K. Ng</i>	414

CONTENTS

v

1997 DECEMBER 20, Number 2

	Page
VOIDS IN THE LARGE-SCALE STRUCTURE <i>Hagai El-Ad & Tsvi Piran</i>	421
MACH ALERT 95-30: FIRST REAL-TIME OBSERVATION OF EXTENDED SOURCE EFFECTS IN GRAVITATIONAL MICROLENSING <i>C. Alcock, W. H. Allen, R. A. Allsman, D. Alves, T. S. Axelrod, T. S. Banks, S. F. Beaulieu, A. C. Becker, R. H. Becker, D. P. Bennett, I. A. Bond, B. S. Carter, K. H. Cook, R. J. Dodd, K. C. Freeman, M. D. Gregg, K. Griest, J. B. Hearnshaw, A. Heller, M. Honda, J. Jugaku, S. Kabe, S. Kaspi, P. M. Kilmartin, A. Kitamura, O. Kovo, M. J. Lehner, T. E. Love, D. Maoz, S. L. Marshall, Y. Matsubara, D. Minniti, M. Miyamoto, J. A. Morse, Y. Muraki, T. Nakamura, B. A. Peterson, M. M. Phillips, M. R. Pratt, P. J. Quinn, I. N. Reid, M. Reid, D. Reiss, A. Retter, A. W. Rodgers, W. L. W. Sargent, H. Sato, M. Sekiguchi, P. B. Stetson, C. W. Stubbs, D. J. Sullivan, W. Sutherland, A. Tomaney, T. Vandehei, Y. Watase, D. L. Welch, T. Yanagisawa, M. Yoshizawa, & P. C. M. Yock (The MACHO and GMAN Collaborations)</i>	436
15 GHz MONITORING OF THE GRAVITATIONAL LENS MG 0414+0534 <i>Christopher B. Moore & Jacqueline N. Hewitt</i>	451
DO THE ELECTRONS AND IONS IN X-RAY CLUSTERS SHARE THE SAME TEMPERATURE? <i>David C. Fox & Abraham Loeb</i>	459
DARK MATTER AND BARYON FRACTION AT THE VIRIAL RADIUS IN ABELL 2256 <i>Maxim Markevitch & Alexey Vikhlinin</i>	467
DETAILED LENSING PROPERTIES OF THE MS 2137-2353 CORE AND RECONSTRUCTION OF SOURCES FROM HUBBLE SPACE TELESCOPE IMAGERY <i>F. Hammer, I. M. Gioia, E. J. Shaya, P. Teyssandier, O. Le Fèvre, & G. A. Luppino</i>	477
OUTFLOW ANGLES, BULK LORENTZ FACTORS, AND KINEMATICS OF OUTFLOWS FROM THE CORES OF ACTIVE GALACTIC NUCLEI <i>Erick J. Guerra & Ruth A. Daly</i>	483
THE EMISSIVE MECHANISM OF FLAT-SPECTRUM RADIO SOURCES <i>Jiancheng Wang, Xuefeng Cen, Jun Xu, & Tongling Qian</i>	501
EVIDENCE OF ABSORPTION DUE TO HIGHLY IONIZED GAS IN THE RADIO-QUIET QUASAR PG 1114+445 <i>I. M. George, K. Nandra, A. Laor, T. J. Turner, F. Fiore, H. Netzer, & R. F. Mushotzky</i>	508
X-RAY SPECTRUM OF THE HIGH-POLARIZATION QUASAR PKS 1510-089 <i>K. P. Singh, C. R. Shrader, & I. M. George</i>	515
A DETAILED STUDY OF THE COMPLEX LINE-EMISSION REGIONS IN THE RADIO GALAXY 3C 34 <i>Mark J. Neuser, Klaus Meisenheimer, & Hans Hippelein</i>	522
A DETAILED COMPARISON OF HUBBLE SPACE TELESCOPE FAINT OBJECT SPECTROGRAPH AND IUE ULTRAVIOLET SPECTRA OF SELECTED SEYFERT NUCLEI <i>Anuradha Koratkar, Ian Evans, Sharon Peto, & Cynthia Taylor</i>	536
NUCLEAR PROPERTIES OF KINEMATICALLY DISTINCT CORES <i>C. Marcella Carollo, I. John Danziger, R. Michael Rich, & Xinzhong Chen</i>	545
THE IMPACT OF STAR FORMATION ON THE INTERSTELLAR MEDIUM. I. THE EXCITATION OF DIFFUSE, WARM IONIZED GAS IN DWARF GALAXIES <i>Crystal L. Martin</i>	561
BIFURCATION, EFFICIENCY, AND THE ROLE OF INJECTION IN SHOCK ACCELERATION WITH THE BOHM DIFFUSION <i>M. A. Malkov</i>	584
NONLINEAR DEVELOPMENT AND OBSERVATIONAL CONSEQUENCES OF WARDLE C-SHOCK INSTABILITIES <i>Mordecai-Mark Mac Low & Michael D. Smith</i>	596
CARBON MONOXIDE AND DUST COLUMN DENSITIES: THE DUST-TO-GAS RATIO AND STRUCTURE OF THREE GIANT MOLECULAR CLOUD CORES <i>Paul F. Goldsmith, Edwin A. Bergin, & D. C. Lis</i>	615
COMPLEX SPECTRA OF THE GALACTIC RIDGE X-RAYS OBSERVED WITH ASCA <i>H. Kaneda, K. Makishima, S. Yamauchi, K. Koyama, K. Matsuzaki, & N. Y. Yamasaki</i>	638
VELOCITY SHIFTS IN L1228: THE DISRUPTION OF A CORE BY AN OUTFLOW <i>Mario Tafalla & Philip C. Myers</i>	653

	<i>Page</i>
THE ESCAPE OF HIGH-ENERGY PHOTONS FROM GAMMA-RAY BURSTS <i>Matthew G. Baring & Alice K. Harding</i>	663
MAGNETIC CANNONBALL MODEL FOR GAMMA-RAY BURSTS <i>Hitoshi Hanami</i>	687
TRANSIENT GAMMA-RAY SPECTROMETER OBSERVATION OF THE BRIGHT GAMMA-RAY BURST GRB 950822 <i>H. Seifert, B. J. Teegarden, T. L. Cline, N. Gehrels, J. J. M. in 't Zand, D. M. Palmer, R. Ramaty, K. Hurley, N. W. Madden, & R. Pehl</i>	697
A SEARCH FOR NONTRIGGERED GAMMA-RAY BURSTS IN THE BATSE DATABASE <i>Jefferson M. Kommers, Walter H. G. Lewin, Chryssa Kouveliotou, Jan van Paradijs, Geoffrey N. Pendleton, Charles A. Meegan, & Gerald J. Fishman</i>	704
SEARCH FOR MILLISECOND PERIODIC PULSATIONS IN BATSE GAMMA-RAY BURSTS <i>Ming Deng & Bradley E. Schaefer</i>	720
OSSE MAPPING OF GALACTIC 511 keV POSITRON ANNIHILATION LINE EMISSION <i>W. R. Purcell, L.-X. Cheng, D. D. Dixon, R. L. Kinzer, J. D. Kurfess, M. Leventhal, M. A. Saunders, J. G. Skibo, D. M. Smith, & J. Tueller</i>	725
AGES OF GLOBULAR CLUSTERS FROM HIPPARCOS PARALLAXES OF LOCAL SUBDWARFS <i>Raffaele G. Gratton, Flavio Fusi Pecci, Eugenio Carretta, Gisella Clemetini, Carlo E. Corsi, & Mario Lattanzi</i>	749
LITHIUM ISOTOPE RATIOS IN HALO STARS. II. <i>L. M. Hobbs & J. A. Thorburn</i>	772
THE AGE OF THE GLOBULAR CLUSTER M68 <i>E. Brocato, V. Castellani, & A. Piersimoni</i>	789
THE SHOCK AND EXTENDED REMNANT AROUND THE CRAB NEBULA <i>Ravi Sankrit & J. Jeff Hester</i>	796
X-RAY SPECTRAL EVOLUTION OF THE CRAB PULSE <i>Steven H. Pralgo, Lorella Angelini, & Alice K. Harding</i>	808
A VLA STUDY OF THE EXPANSION OF TYCHO'S SUPERNOVA REMNANT <i>E. M. Reynoso, D. A. Moffett, W. M. Goss, G. M. Dubner, J. R. Dickel, S. P. Reynolds, & E. B. Giacani</i>	816
X-RAY AND OPTICAL IMAGERY OF THE SN 1006 SUPERNOVA REMNANT <i>P. Frank Winkler & Knox S. Long</i>	829
LOW-FREQUENCY NONRADIAL OSCILLATIONS IN ROTATING STARS. I. ANGULAR DEPENDENCE <i>Umin Lee & Hideyuki Saio</i>	839
DOES THE MOMENTUM FLUX GENERATED BY GRAVITATIONAL CONTRACTION DRIVE ASYMPTOTIC GIANT BRANCH MASS LOSS? <i>B. M. Lewis</i>	846
A NONGRAY THEORY OF EXTRASOLAR GIANT PLANETS AND BROWN DWARFS <i>A. Burrows, M. Marley, W. B. Hubbard, J. I. Lunine, T. Guillot, D. Saumon, R. Freedman, D. Sudarsky, & C. Sharp</i>	856
DIGGING DEEPER IN THE CORONAL GRAVEYARD <i>Thomas R. Ayres, Alexander Brown, G. M. Harper, P. D. Bennett, J. L. Linsky, K. G. Carpenter, & R. D. Robinson</i>	876
THE EVOLUTIONARY STATUS OF UX ORIONIS-TYPE STARS <i>A. Natta, V. P. Grinin, V. Mannings, & H. Ungerechts</i>	885
INVERSE COMPTON SCATTERING: GAP PARAMETERS, ENERGY LOSS OF THE PARTICLES, AND POSSIBLE IMPLICATIONS FOR PULSAR RADIO EMISSION <i>B. Zhang, G. J. Qiao, & J. L. Han</i>	891
HOPKINS ULTRAVIOLET TELESCOPE OBSERVATIONS OF HERCULES X-1 <i>Bram Boroson, William P. Blair, Arthur F. Davidsen, S. D. Vrtillek, John Raymond, Knox S. Long, & Richard McCray</i>	903
EXTREME ULTRAVIOLET EXPLORER SPECTRA OF THE 1993 MARCH FLARES ON AD LEONIS: THE DIFFERENTIAL EMISSION MEASURE AND IMPLICATIONS FOR CORONAL STRUCTURE <i>Scott L. Cully, George H. Fisher, Suzanne L. Hawley, & Theodore Simon</i>	910
ULTRAVIOLET EVENTS OBSERVED IN ACTIVE REGIONS. II. AN INTERPRETATION OF FLARING ARCHES AND ASSOCIATED SMALL FLARES <i>J. Fontenla, M. Rovira, & E. Tandberg-Hanssen</i>	925
YOHKOH SOFT X-RAY DETERMINATION OF PLASMA PARAMETERS IN A POLAR CORONAL HOLE <i>Carl R. Foley, J. Leonard Culhane, & Loren W. Acton</i>	933

CONTENTS

vii

ELECTRON ACCELERATION IN SOLAR FLARES BY FAST MODE WAVES: QUASI-LINEAR THEORY AND PITCH-ANGLE SCATTERING <i>James A. Miller</i>	Page 939
OBSERVATION AND MODELING OF SOFT X-RAY BRIGHT POINTS. II. DETERMINATION OF TEMPERATURE AND ENERGY BALANCE <i>Charles C. Kankelborg, Arthur B. C. Walker II, & Richard B. Hoover</i>	952
SEISMOLOGICAL COMPARISON OF SOLAR MODELS WITH ELEMENT DIFFUSION USING THE MHD, OPAL, AND SIREFF EQUATIONS OF STATE <i>Joyce A. Guzik & Fritz J. Swenson</i>	967
LONG-TERM VARIATION OF THE INTERPLANETARY H Ly α GLOW: VOYAGER MEASUREMENTS AND IMPLICATIONS FOR THE SOLAR H Ly α IRRADIANCE <i>Giuliana de Toma, Eric Quémerais, & Bill R. Sandel</i>	980
PHYSICAL PROPERTIES OF THE SOLAR MAGNETIC PHOTOSPHERE UNDER THE MISMA HYPOTHESIS. I. DESCRIPTION OF THE INVERSION PROCEDURE <i>J. Sánchez Almeida</i>	993
ABSTRACTS OF THE ASTROPHYSICAL JOURNAL SUPPLEMENT SERIES, 1998 JANUARY	
COBE-DMR-NORMALIZED OPEN COLD DARK MATTER COSMOLOGIES <i>Krzysztof M. Górski, Bharat Ratra, Radosław Stompor, Naoshi Sugiyama, & A. J. Banday</i>	1009
DECAYING NEUTRINOS AND LARGE-SCALE STRUCTURE FORMATION <i>Somnath Bharadwaj & Shiv K. Sethi</i>	1009
A NEAR-INFRARED SPECTROSCOPIC SURVEY OF LINER GALAXIES <i>J. E. Larkin, L. Armus, R. A. Knop, B. T. Soifer, & K. Matthews</i>	1010
ASCA OBSERVATIONS OF SEYFERT 1 GALAXIES. III. THE EVIDENCE FOR ABSORPTION AND EMISSION DUE TO PHOTOIONIZED GAS <i>I. M. George, T. J. Turner, Hagai Netzer, K. Nandra, R. F. Mushotzky, & T. Yaqoob</i>	1010
NONPARAMETRIC STATISTICAL MODELS OF SPHERICALLY SYMMETRIC KINEMATICS <i>William D. Heacox</i>	1011
FG SAGITTAE: A NEWBORN R CORONAE BOREALIS STAR? <i>Guillermo Gonzalez, David L. Lambert, George Wallerstein, N. Kameswara Rao, Verne V. Smith, & James K. McCarthy</i>	1011
TEMPERATURE DEPENDENCE OF ULTRAVIOLET LINE AVERAGE DOPPLER SHIFTS IN THE QUIET SUN <i>J. Chae, H. S. Yun, & A. I. Poland</i>	1011